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U. S. Department of Agriculture
Bureau of Entomology and Plant Quarantine
Forest Insect Laboratory
341 Giannini Hall, U. C.
Berkeley 4, California

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ENTOMOLOGICAL WORK PLAN
For The
JULIAN - PINE HILLS INSECT CONTROL PROJECT

The Julian-Pine Hills insect control project, which is now being organized as a cooperative undertaking by State, private and federal agencies within the "Zone of Infestation" established by the State Board of Forestry, has as its objective the halting of a serious outbreak of bark beetles in the Coulter pine stands of recreational areas surrounding Julian, San Diego County, California. The principal insects involved are the five-spined engraver beetle Ips confusus, the western pine beetle (Dendroctonus brevicomis) and the red turpentine beetle (Dendroctonus valens).

In its role as advisory entomological consultant, the Berkeley Forest Insect Laboratory, Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture has been called upon to outline the necessary entomological requirements of the project and will be expected to supervise the spotting of infested trees to be treated, to recommend and supervise methods of treatment, and to inspect the work from time to time to see that it is being adequately performed. The laboratory representative will work in close cooperation with the State Division of Forestry, the private timber owners and the other agencies involved.

General Objectives

The primary objectives of the present control project are:-

(1) To stop the present epidemic infestation of pine beetles at the least possible cost and
(2) To protect the remaining stands of pine in and around the summer home and resort areas.

The accomplishment of these objectives requires a close study of insect behavior under the peculiar conditions found on this area and the application of entomological techniques which will have to be adapted to conditions in the field. There is no standard routine control procedure which may be applied. Therefore the job is going to require the closest possible integration of entomological requirements with the practical problems of applying control measures.

Entomological Requirements

In order to be successful certain requirements are essential in respect to extent of area to be treated, the disposal of infested trees and the

and the timing of control work.

(1) Units to be treated.
In the Julian-Cuyamaca Area there are four rather distinct entomological units. From north to south these are:- Volcan, Julian, Pine Hills and Cuyamaca. The present control project is limited to the Julian and Pine Hills units: the boundaries of which are shown on the attached map.

The Julian unit embracing about 2000 acres of timberland, contains the heaviest concentration of infestation. Here is where control work should be started. All of the timberland in this unit should be carefully covered with systematic spotting and treating.

The Pine Hills unit takes in all of the timberland south of the Julian unit to Cuyamaca Lake and Boulder Creek, including a corner of the Cuyamaca Rancho State Park. In this unit group infestation is scattered over some 14,000 acres of land. In view of the character of this infestation it does not seem necessary to cover the area with strip spotting. Instead topographic spotting should be sufficient to pick up new infestation adjacent to old group.

(2) Spotting
"Spotting" is the process of locating and marking for treatment those trees containing primary tree-killing beetles. On this project the principal insects to be treated are (1) the five-spined pine engraver beetle (Ips confusus) and (2) the western pine beetle Dendroctonus brevicomis.

Trees to be spotted may be grouped in the following classes.

A. Infested trees
Trees currently infested with overwintering broods of Ips or D.b., which can be checked by basal examination will be marked for treatment.
Ips trees - Trees currently infested with Ips will show some slight fading at the top or may be entirely green. "Sorrel tops" and "red tops" have now been largely abandoned by Ips broods and hence do not need to be treated for control of these beetles.
D.b. trees - Many top killed trees, now red or sorrel, will show work of the western pine beetle in the lower bole. These trees will be marked for treatment.
B. Top-killed Trees
What to do with top killed trees, showing no evidence of insect attack on the main trunk will present quite a problem. In general the following spotting rules will apply:-
Spot top-killed trees for cutting:-
(1) If tree under 16" d.b.h. and in a group of newly attacked Ips trees, top may be fading or green.
(2) If tree over 16" d.b.h. and more than 50% of crown killed; tree in newly killed Ips group.
(Infested trees can be detected by boring dust in cobwebs or bark crevices.)
Do not spot top-killed trees for cutting:-

(1) If top is sorrel or red, and no insect work on lower bole or
(2) Tree with fading top less than 50% of crown affected.

Around summer homes where trees are of high value, it may be desirable to cut the infested, dead tops out of trees where more than 50 percent of the lower crown is still alive. In a good many cases such trees can be saved, particularly if the lower bole is sprayed with a protective spray.

Spotting Technique

Standard methods of spotting and mapping the areas to be treated will be followed as described in detail in Buckhorn's** survey manual.

Trees will be spotted by groups and tagged with a serial number. The serial number will be marked with crayon on a blaze on the first tree of the group, and all other trees in the group will be blazed and marked with the same number, plus a digit for each tree 16" d.b.h. or over in the group. The spotting record will show the number and diameter of all trees 16 inches or over and the number of poles under 16 inches.

Each spotter will fill out a spotting record showing (1) serial number (Spotter A will start his series with number "1" and run to 500 inclusive; Spotter B will start his series with "501" and run to 1000 inclusive") (2) "Killed by", (3) D.b.h. or number of poles, and on the right of the page one column will be used for checking treatment.

Maps will be made on an 8" to the mile scale. The number of trees and poles in each group will be circled and the serial number of the group shown outside the circle. Important topographic features and property lines will be shown, so as to determine the location and ownership of infested trees. Copies of maps will be made for the treating crews.

Treating

The method of treatment will vary with the species of bark beetle to be controlled as well as the location of infested trees.

All Ips infested trees either in poles, under 16 inches d.b.h., or tops of larger trees will be cut, piled and burned. All D.b. infested trees under 16" d.b.h. will also be cut, piled and burned.

Larger D.b. trees (normally those larger than 16 inches d.b.h.) if occurring singly or in small groups will be felled, the top of the infested

**"Instructions For Making Barkbeetle Surveys in the Virgin ponderosa Pine stands of Oregon and Washington," by Walter J. Buckhorn. Forest Insect Laboratory, Portland, Oregon. June 1946. Mimeographed.

portion of the log peeled and the infested bark burned along the side of the log.

In areas where it is dangerous to burn or where burning conditions are not favorable, it is recommended that infested logs and tops be sprayed with one of the following formulae:

(1) Orthodichlorobenzene — 1 part by volume
Fuel oil #2 — 4 parts by volume
at rate of approximately 2 gallons of spray per tree.

(2) DDT technical grade — 1 pound
*Velsicol AR50 or NR-70 — 2 pints
Fuel oil #2 — 4 gallons
A 3.3% DDT applied at the rate of approximately 2 gallons per 200 square feet of bark surface (an average tree 20" x 70")

(3) Benzene hexachloride
(10 to 12% gamma isomer) — 1 pound
*Velsicol AR50 or NR-70 — 2 pints
Fuel oil — 4 gallons
Applied at rate of 2 gallons per 200 square feet of bark surface.

Benezene hexachloride which has not been previously used on a large scale control project, has given good experimental results and may prove to be the most effective of the above sprays. It does have an objectionable oder which would not be too serious an objection for outdoor use. DDT is nearly as effective and also can be used as a protective spray on top-killed trees which are desirable to save.

In general it will be found much cheaper to apply penetrating oils than to peel the bark from infested trees. In the spring of the year, oil and DDT sprayed on the surface will act as an effective control of emerging beetles.

Time of Treatment

Ips are now overwintering larbely as adults and pupae. These will start emerging in the spring with the first warm weather when air temperature rises above 70°. Therefore all group infestations of Ips should be treated before the end of March, and preferably earlier.

D.b. are overwintering largely in the larval stage. Bark infested with D.b. should be burned or sprayed before the 20th of April.

Preventative Treatment

It is the habit of Ips beetles to hibernate during the winter period and then build up their populations in slashings during the spring

*Benzene, xylene or acetone can be substituted as a solvent.

months, later emerging from this material to attack standing trees. The success of this project will depend upon how well infested spring slash is cleaned up and beetles destroyed.

To catch emerging broods, it may be advisable to fell some of the top-killed trees and leave them for traps - after attack has occurred these should be burned or sprayed. No breeding material should be left for more than 40 days during the spring months without treatment.

Protective Sprays

Top killed trees and others close to recently infested groups may be vulnerable to attack by beetles emerging in the spring. To protect such trees from attack, it is recommended that especially valuable trees be sprayed with a protective spray as follows:-

16 pound DDT (technical grade)
4 gallons benzene or xylene
2 pints Triton X-155 (Rohm and Haas) 1404 Franklin St., Oakland, California)
100 gallons of water

This spray should be applied to the trunk of trees at the rate of about 2 gallons of spray per tree, in a finely atomized form at the time beetles first begin emerging from overwintering brood trees- probably about the 15th of April in the Julian area.

F.P. Keen
Entomologist, In Charge

cc: Ranger Lewis
Jim Mace
State Forester
FCC
R.O.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT LABORATORY - BERKELEY, CALIFORNIA

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FOREST INSECT SURVEY

LAGUNAS INFESTATION AREA

SAN DIEGO COUNTY, CALIFORNIA

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